MONARC - 155mm Artillery for Frigate Size Ships

Presentation to the

39th Annual Gun & Ammunition Missiles & Rockets Symposium

April 16th 2004

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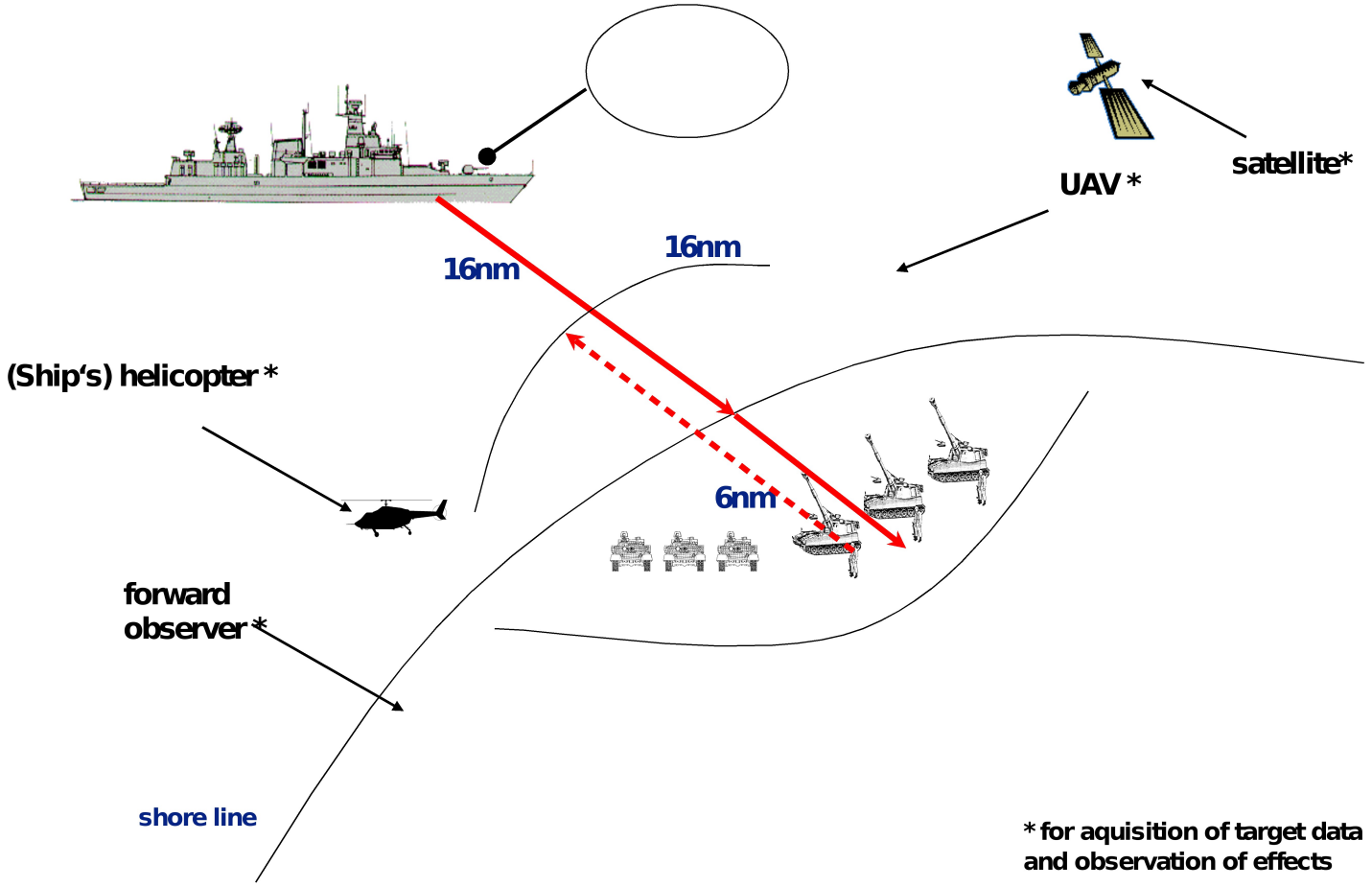
The Problem

Requirement for Naval Surface Fire Support



The Solution

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The Team

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An initiative of

- the biggest German shipyard
- Europe‘s leading system contractor for armoured vehicles
- one of the world‘s most innovative suppliers for ground forces equipment

Rheinmetall W&M GmbH

Howaldtswerke Deutsche Werft AG

Krauss-Maffei Wegmann GmbH & Co KG

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The Initiative

The Project Group

MONARC® = MOdular Naval ARtillery Concept

Common activity of the Companies

- **Howaldtswerke Deutsche Werft AG (HDW)**
- **Krauss-Maffei Wegmann GmbH & Co KG (KMW)**
- **Rheinmetall W&M GmbH (RWM)**

to provide NSFS capability with a low-cost solution by integrating the PzH 2000 turret on board of a frigate

First Ideas started on September 16th 2002

Presentation to German Navy Officials (BWB and MarA) on December 11th 2002 at HDW shipyard in Kiel

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PzH 2000 onboard Frigate 124 “Hamburg“

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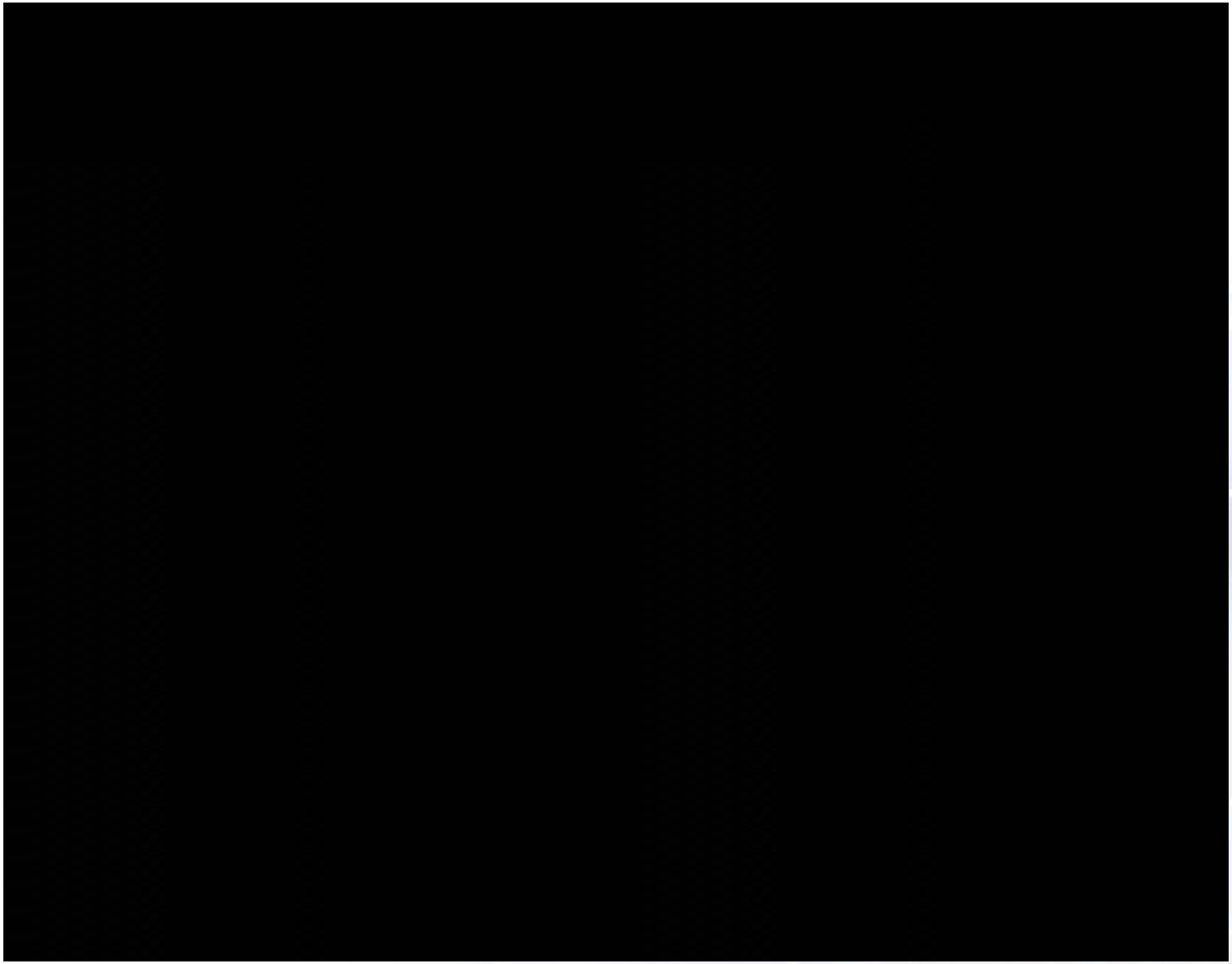
Modular Naval Artillery Concept 155mm



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PzH 2000 Main Characteristics

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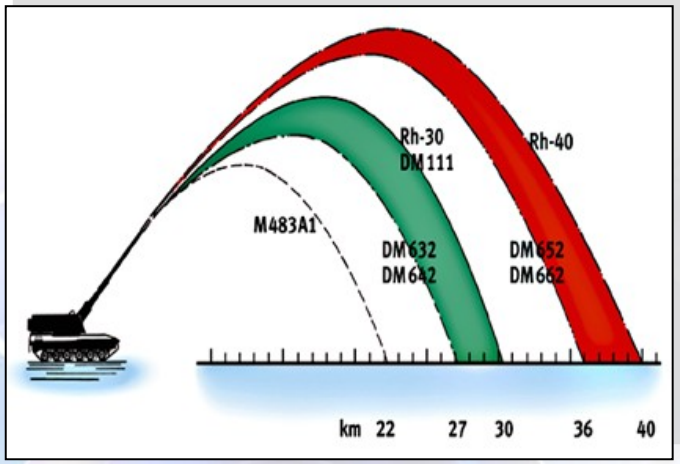
Essential characteristics of the L52 gun:

- Long maximum effective range up to 40 km
- High rate of fire (3 rounds in less than ten seconds, 12 rounds in one minute proven)
- Modular propelling charge system, auto-matic primer magazine and automatic shell loading
- Long barrel life (demonstrated in live fire trials: > 2,500 with six charge modules, > 5,000 rounds with five modules)
- A balanced mix of ammunition covering accuracy and maximum



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Integration onboard a ship

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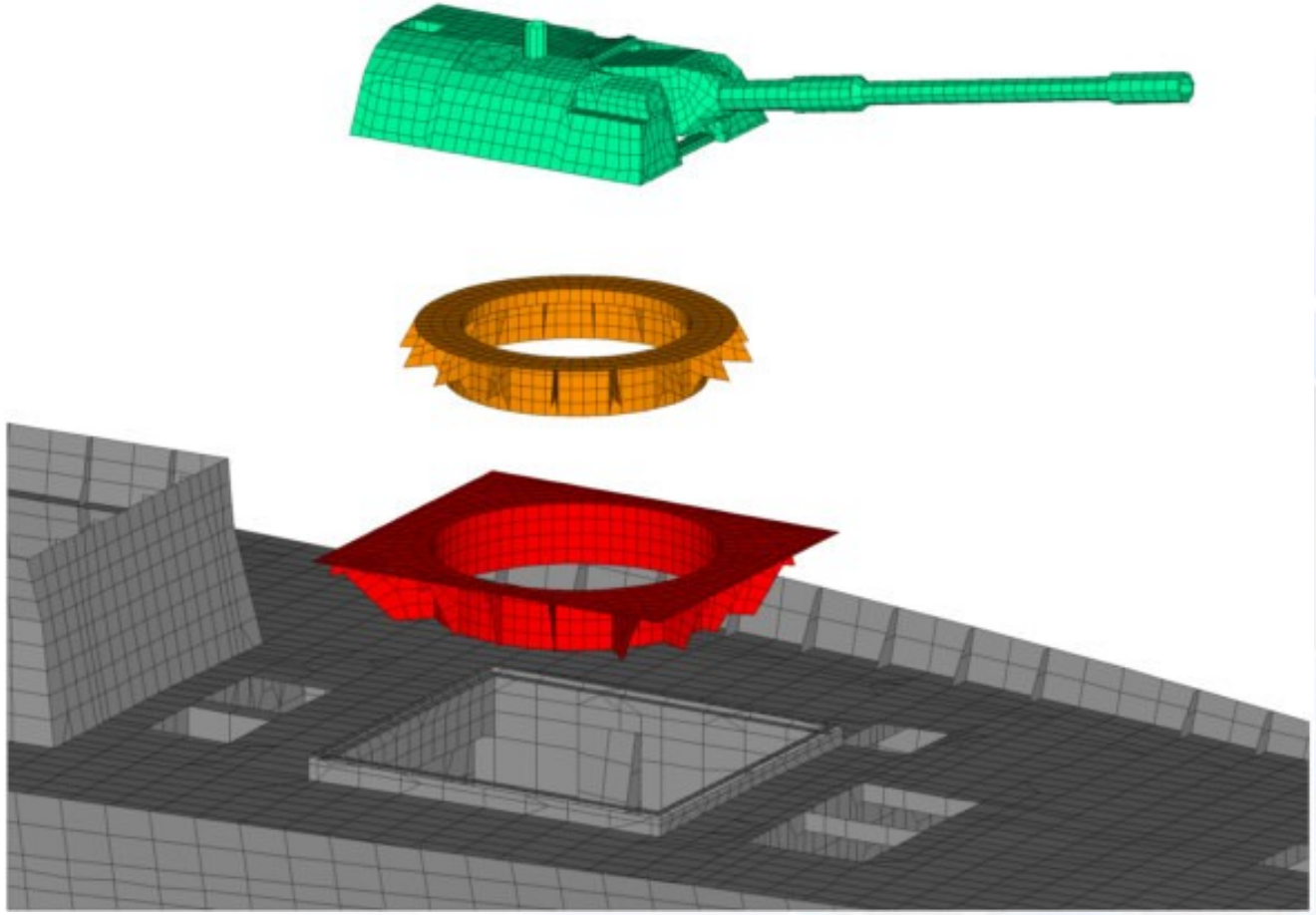

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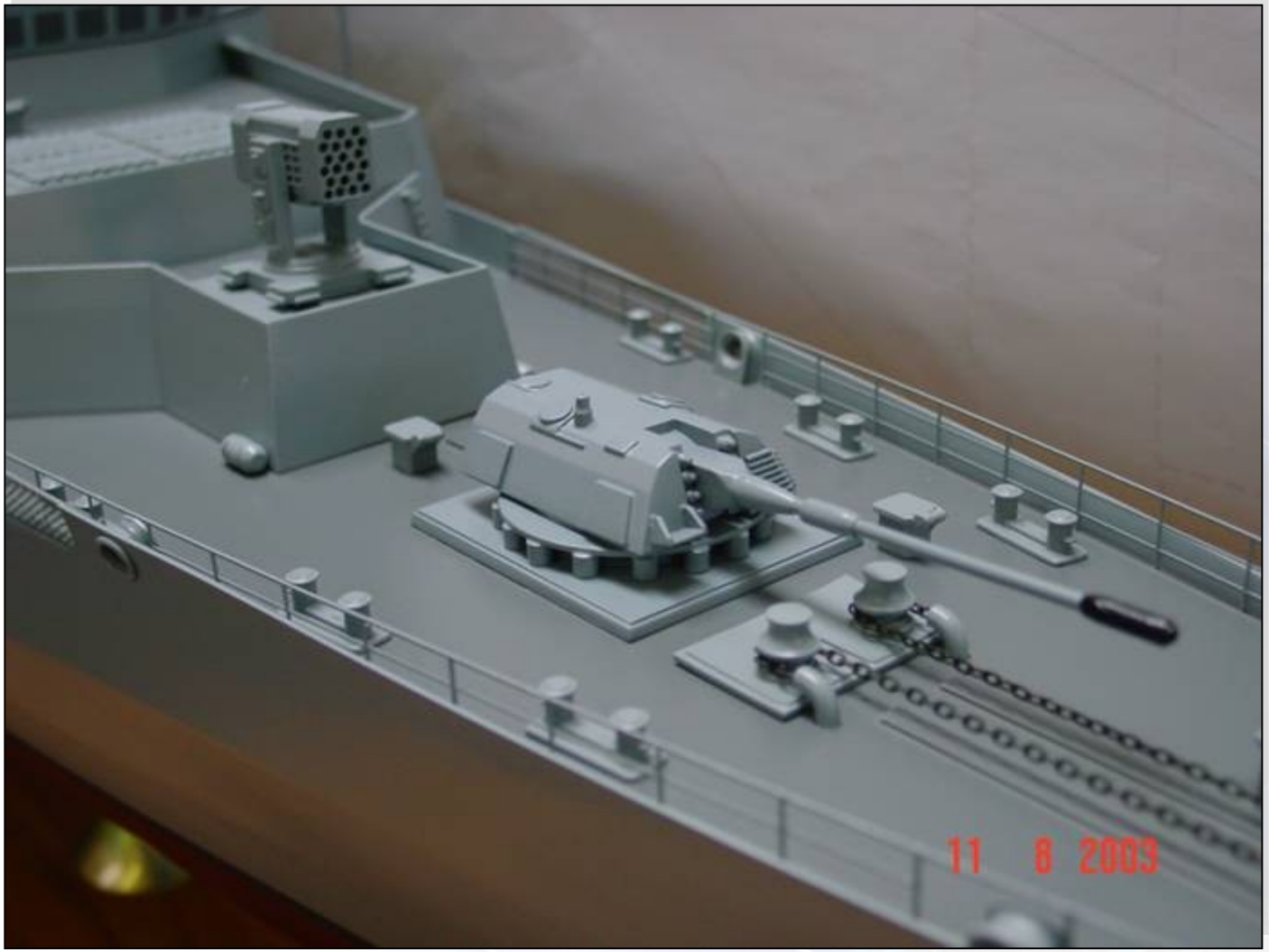
Integration onboard a ship



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Integration onboard a ship

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Mechanical Set-Up

- No problem with weight or volume as the PzH turret mass is only 18t
- Recoil force management requires elastic mountings designed with respect to the ship‘s properties
- This ensures that the system can be retrofitted to existing ships with only minor conversion efforts

Electrical Set-Up

- Only 24V power supplies are needed from the ship‘s installations

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Validation of the Mounting

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Validation of the Mounting

- The elastic mountings for frigate type ships have been designed and manufactured
- In a firing test, on the Rheinmetall proving range in Unterlüß in June 2003, the expected results for these mountings were validated
- Measured forces and accele-rations verified the concept of elastic mounting and provide the baseline for the integration of MONARC on any other practical type of ship
- Additional measurements of the muzzle report, provided the sound envelope needed to determine the obstacle contouring limits

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Conclusion

- In December 2002 the principle of integrating a PzH 2000 155mm turret on a F124 platform was demonstrated
- This preliminary integration was only a six weeks effort
- German MoD and Navy immediately started the initiative to actively support the MONARC program
- More detailed analysis independent of F124 program was performed early in 2003
- Land based firing tests took place in June 2003 and validated the integration concept
- A German User Requirement Document on Naval Fire Support will be established in 2004

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Next steps

- Adapt the gun for engagement of moving targets from a moving platform
- Validate the ammunition transport on moving platforms
- Substantiate these results in firing tests on board

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